

The final annealing operation is to allow any subsequent sizing operations and, in the case of 9 and 14 ct gold alloys, remove the risk of stress corrosion.

A modification has been made to the containers in which the compacts are sintered. The long sintering times resulted in some loss of zinc from the zinc-containing carat gold alloys which, in turn, led to slight over-caratage of the rings. By putting a loose-fitting lid onto the containers the problem was effectively eliminated. The containers themselves have a few holes drilled in the sides to allow water to enter during the quenching operation after sintering.

CONCLUDING REMARKS

The press and sinter technique has now enjoyed nearly three full years of use at Engelhard-CLAL and, in the period up to August 2000, over 500,000 carat gold rings had been produced.

While the technique is a very simple and straightforward example of the use of powder metallurgy in producing net-shape products, it is believed to be the first time that it has been used in the mass production of gold jewellery. The technique is widely applicable to carat gold alloys while the rings themselves have significant hardness and ductility benefits compared with conventionally-produced rings, largely due to the fine grain size.

The overall process yields of greater than 85% compare extremely favourably with yields of about 30% for conventional rings and bring a range of economic benefits by reducing metal financing, recycling, refining and labour costs.

ACKNOWLEDGEMENTS

It is a pleasure to acknowledge the contribution to this development made by a number of staff at Engelhard-CLAL, particularly Terry Taylor, and to thank Mr Akin

Akintola, Business Support Director at Engelhard-CLAL UK Ltd, for his permission to write this paper.

Figure 15 is reprinted with permission from Metal Powder Industries Federation, 105 College Road East, Princeton, New Jersey, USA.

ABOUT THE AUTHOR

Peter Raw is a graduate of Cambridge University in Natural Sciences (Metallurgy). He was successively Production Director and Development Director at Engelhard-CLAL UK Ltd between 1984 and 1996 when he became a precious metals consultant. In this latter role he has often worked for the World Gold Council and has published several papers in *Gold Technology*.

REFERENCES

- 1 'Investment Casting', Technical Advisory Manual for Goldsmiths, World Gold Council, 1995
- 2 Handbook on Casting and Other Defects in Gold Jewellery Manufacture, World Gold Council, 1997
- 3 J.T. Strauss, *Gold Technology*, No 20, November 1996, 17-29
- 4 Engelhard-CLAL Ltd, International Patent Application No PCT/GB98/02733, 1998
- 5 Engelhard-CLAL Ltd, South African Patent No 98/8340, 2000
- 6 P.M. Raw, *Gold Technology*, No 27, November 1999, 2-8
- 7 J.T. Strauss, *Proc of the Twelfth Santa Fe Symposium on Jewelry Manufacturing Technology*, Met-Chem Research Inc, 1998, 425
- 8 J.J. Dunkley, in 'Powder Metallurgy - An Overview', The Institute of Metals, 1991, pp. 2-21
- 9 W.A. Kayser, in 'Powder Metallurgy - An Overview', The Institute of Metals, 1991, pp. 168-182
- 10 C.G. Goetzl, 'Treatise on Powder Metallurgy - Volume 1', Interscience Publishers Inc, 1949, pp. 123-125
- 11 British 'Wheatseaf' system of ring sizing now largely superseded by International Standard ISO 8653

EUROPACATV

5th European Congress on Catalysis

Symposium on Gold and Silver Catalysis University of Limerick, Ireland, 2- 7 September, 2001

One of the eighteen Symposia planned for this Conference is on 'Catalysis by Gold and Silver'. It is being convened and chaired by Dr David Thompson : Fax: +44 118 984 5717; E-mail: DTThompson@aol.com) and Prof dr ir Leon Lefferts (University of Twente, The Netherlands) : Fax: +31 53 4894683; E-mail: l.lefferts@ct.utwente.nl. Early submission of abstracts for papers will be welcome.

If you are interested in finding out more about any other aspects of the programme contact:

EuropacatV, University of Limerick, Limerick, Ireland Tel: +353 61202641 Fax: +353 61202602

E-mail: europacatv@ul.ie Website: <http://www.ul.ie/~cer/EuropaCatV.html>

Abstracts should also be sent to this address.